

Why Blame Smallpox?

The Death of the Inca Huayna Capac and the Demographic Destruction of Tawantinsuyu (Ancient Peru)

Robert McCaa, Aleta Nimlos, and Teodoro Hampe Martínez

Será hombre como de cuarenta años, de mediana estatura, moderno
y con unas pecas de viruelas en la cara...
—description of Inca Titu Cusi Yupanqui, 18 June 1565¹

Introduction

Smallpox is widely blamed for the death of the Inca Huayna Capac and blamed as well for the enormous demographic catastrophe which enveloped Ancient Peru (Tawantinsuyu). The historical canon now teaches that smallpox ravaged this virgin soil population before 1530, that is, before Francisco Pizarro and his band of adventurers established a base on the South American continent.² Nevertheless the documentary evidence for the existence of a smallpox epidemic in this region before 1558 is both thin and contradictory. In contrast to Mexico, where there is a broad range of sources documenting the first outbreak and the death of the Aztec ruler Cuitlahuatzin from smallpox in 1520, for Peru, the evidence rests almost entirely on rather brief references in chronicles, few of which state unequivocally that Huayna Capac died of the disease.

We advocate a more skeptical approach to assessing the causes of both the Inca's death and the demographic destruction of Tawantinsuyu. While the continued scrutiny of early colonial chronicles may yet provide conclusive evidence, we urge historians to take greater account of a wider-range of unconventional sources, such as linguistic evidence from early Quechua dictionaries, lessons learned from the World Health Organization's global campaign to eradicate smallpox, physical descriptions of native peoples, and the examination of mummies for signs of smallpox, or the lack

¹Cited in Raul Porras Barrenechea, *Los Cronistas del Perú (1528-1650) y otros Ensayos* (Lima: 1986), 549. The description is by the agent of the Oidor Lic. Don Juan de Matienzo.

²That smallpox caused Huayna Capac's death has become historical canon is demonstrated by the fact that a newly published, nuanced, wide-ranging history devoted to debunking seven mega-myths of the Spanish Conquest embraces this thesis; see Matthew Restall, *Seven Myths of the Spanish Conquest* (Oxford 2003), 48. Suzanne Austin Alchon (*A Pest in the Land: New World Epidemics in a Global Perspective*, Albuquerque 2003, p. 67-68) recounts the evidence before accepting the smallpox as the most likely explanation (p. 76).

thereof. As in the epigraph, early descriptions of native peoples, which remark on the presence of pockmarks, may settle the question regarding the first appearance of the dreaded disease in the Andes as well as the degree of devastation which it caused. Moreover, we shall touch on the dramatic circumstances under which the mummy of Huayna Capac was retrieved from its rural palace of Quispeguanca in the valley of Yucay to be moved first to Cuzco, under the inspection of *corregidor* (chief magistrate) Polo de Ondegardo, and later on to the Hospital Real de San Andrés in Lima – the last resting place of the Incas. One of the authors of this paper is engaged in a project to locate and recover the mummy of the Inca Huayna Capac. Should this prove impossible, might the examination of early colonial mummies help resolve the conundrum about the first appearance of smallpox in the Andean region?

From our re-examination of early chronicles (see table 1), linguistic evidence in three early dictionaries (table 3), physical descriptions of pock marked native peoples (or the lack thereof before 1558), we conclude that, as in the Caribbean also in the Andean region, the preponderance of the evidence points to a late introduction of smallpox—a quarter century after initial contact (in 1518 and 1558, respectively), after an enormous demographic devastation had already occurred.³ In Peru, the principal causes of the disaster before 1558 were decades of civil war, destruction, and oppression (see table 4 for examples of linguistic change in this regard). Until new, more convincing evidence emerges, we urge historians to be more cautious in ascribing the death of Huayna Capac to smallpox, and more importantly, less assertive that a smallpox epidemic ravaged the region in the 1520s (see table 2). Indeed there is a possibility that the very mummy of the Inca Huayna Capac will be found and become available for analysis (Appendix A). In the meantime many mummies from the first half of the sixteenth century are being found, but none, as yet, show signs of pockmarks.⁴ As the negative evidence continues to mount for the early introduction of smallpox, it seems

³ Massimo Livi Bacci, “Return to Hispaniola: Reassessing a Demographic Catastrophe,” *Hispanic American Historical Review* LXXXI:1(Feb 2003), 3-51. See also by the same author, “Las múltiples causas de la catástrofe: consideraciones teóricas y empíricas,” *Revista de Indias*, LXIII:227(ene-abr 2003), 31-48. Noble David Cook has recently hypothesized that as early as 1493 smallpox may have been introduced into the islands, but the thesis is highly speculative; see “¿Una primera epidemia americana de viruela en 1493?,” *Revista de Indias*, LXIII:227(ene-abr 2003), 49-64.

⁴ Interview with Dr. Guillermo Cock, leader of the Puruchuco burial grounds recovery project, Lima, Perú, October 9, 2003. Dating over a period of 75 years of the Late Horizon period, more than 2,000 mummies have been recovered. Their excellent state of preservation and the presence of Spanish goods in a notable fraction of the mummy bundles make this an unusually promising find. Nevertheless it will be years before the bioarchaeological assay is complete. See: http://news.nationalgeographic.com/news/2002/04/0410_020417_incamummies.html .

increasingly likely that smallpox did not become a big killer in the Andean region before 1558, a quarter century after Huayna Capac's death.

The Death of Huayna Capac

The Inca Huayna Capac's sudden death, at the peak of his wealth and power, is unique because no other Inca ruler was reported to have died so mysteriously. The demise of Huayna Capac is quite remarkable. Of all the great Incas only his is told with such an abundance of details, although the evidence is rather scanty and conflicting when compared with the death of the Aztec ruler Cuitlahuatzin, whose death from smallpox is unquestionable.⁵ As was customary for Inca rulers, Huayna Capac's body was embalmed on the spot with the heart and other internal organs removed. The mummy was dressed in precious mantles and adorned with feathers and gold, before being conducted on a litter to Cuzco with great ceremony (Figure 1).⁶ In the Inca practice of ancestor worship a dead king continued to wield much power as an oracle and a focus of legitimization of office. The dead king was supported by his *panaqa*, or royal lineage, from the produce of his own lands, herds and yanaconas (see Hampe Martínez, 1982: 405-407, and Alonso Sagasetta, 1989). It is remarkable that there is no mention of the embalmers having died or fallen ill while preparing the body. Nor are there references to illness spreading along the Inca roads as the mummy was carried to Cuzco. Nor did Atahualpa suffer ill effects from the portions retained of his father's flesh.⁷

Francisco Pizarro and his troop first received word of Huayna Capac's death around October 1531 while encamped on the island of Puná near Guayaquil (cf. Ballesteros Gaibrois, 1963: 81-82, 103, 106, 109-110, 112, 114). Many of the Spanish *cronistas* mention the Inca's illness as one vignette in the much larger telling of the history of the Inca people and the Christian conquest. Native accounts do not appear until the early 17th century, when three classics were penned, but only one, that by the Inca Garcilaso de la Vega, was published before the 20th century. The year of Huayna

⁵ Robert McCaa, "Spanish and Nahuatl views on smallpox and demographic catastrophe in Mexico", in *Journal of Interdisciplinary History* XXV(1995), 403.

⁶ Guaman Poma de Ayala, *El primer Nueva corónica y buen gobierno*: <http://www.kb.dk/elib/mss/poma/index-en.htm>, p. 379.

⁷ Juan de Betanzos, *Narrative of the Incas*, trans. from the Palma de Mallorca manuscript by Roland Hamilton and Dana Buchanan (Austin: University of Texas Press, 1996), 192: Atahualpa "also wanted to prepare statues of the hair and nail clippings that were left over and some of his father's flesh, which he had retained when the body was preserved in order to take it to Cuzco." Guaman Poma reports Quechua terms for an ancient illness caused by contact with a cadaver (p. 255 and 690: "*ayapcha unquykuna*", "*ayapchasqa*").

Capac's death remains in dispute with some authors favoring as early as 1524, and others as late as 1530, based on a chronology inferred from testimonials of native leaders educated in the Yachayhuasi.⁸

The most important early chroniclers writing on the decades of conquest agree that Huayna Capac died suddenly of a mysterious illness, but there is remarkable uncertainty regarding the cause or symptoms. According to our count, smallpox is the explanation given by six of the seventeen chroniclers who state one or more causes (see Table 1). Fever is favored by three, measles by two, severe rash or inflammation of the skin by two, and one each writes of boils, "perlesía", "romadizo", pain, or melancholy. Clearly Huayna Capac's death was considered important to most chroniclers, but the exact cause or symptoms were puzzling. Pedro Sarmiento de Gamboa, Martín de Murúa and the Inca Garcilaso de la Vega constrain their descriptions of the cause with phrases such as "cuentan que", "unos dicen ... otros dicen", and "aunque otros dicen". Were chroniclers who used this sort of phrasing seeking to caution the reader that the author was unable to judge and instead was relying on hearsay?

Table 1 near here (20 early chronicles)

Interpreting the chronicles

The linguistic challenge faced by the chroniclers, all of whom were "cristianos" writing in Spanish was considerable, even though native quipucamayocs, amautas, and relatives of the Incas were claimed as informants. Illness and pestilence was well known in Ancient Peru. Guaman Poma, for example, explains that September was the month for getting rid of "pestilencias y enfermedades", "when all the houses and streets were flooded with water and cleaned throughout the kingdom" (p. 255). The author's mother tongue was Quechua and his 1200 page manuscript incorporates an extensive Quechua vocabulary, including several terms regarding illness (cf. p. 255, "oncu", "uncu", "oncoy", etc.)/

The earliest testimony regarding the death of Huayna Capac is that of the Inca Atahualpa himself, as related by Francisco de Xerez, who described Huayna Capac as dying of "aquella enfermedad" (see Table 1). It is a pity that Xerez allowed this ill-defined demonstrative pronoun to enter the record.

One of the most-trustworthy early chroniclers, Juan de Betanzos, was married to a niece and adopted daughter of the Inca Huayna Capac.⁹ Betanzos' opus, which

⁸María Concepción Bravo Guerreira, "La muerte de Huayna Capac, 1530: precisiones cronológicas,"

attributes the Inca's death to "una sarna y lepra", was completed in 1552 but not published in its entirety, including the chapter on Huayna Capac's death, until 1987. Historians only recently gained the opportunity to take into account the complete narrative. Given the early date of the chronicle, its reliance on the Inca's immediate family as informants, and the author's extraordinary zeal for knowledge of the Inca past, one might expect that his testimony that the Inca died of "una sarna y lepra" might have called for a re-assessment of the smallpox thesis. Unfortunately this has not been the case. Cook argues that "sarna" could be mistaken for smallpox, and that Betanzos' text "parallels" that of the widely cited Cieza de Leon (Cook 1998:76-7). To permit readers to examine the narrative directly, we quote Betanzos' text in extenso in Appendix B. The key phrase is reads (p. 200): "...le dio una enfermedad la cual enfermedad le quitó el juicio y entendimiento y dióle una sarna y lepra que le puso muy debilitado..."

Note that the chronicler uses here the indefinite article "una" with respect to "sarna". This connotes a nonspecific nature or vagueness of identity, as opposed to the use of the very specific "la" in connection with the words sarna and lepra. Is the author using lepra as an adjective to describe the cutaneous eruptions of smallpox, measles, typhus, verruga, or other disease involving eruptions of the skin? Or is he attempting to describe something like sarna and lepra, a severe inflammation of the skin, but not smallpox, measles or any other disease common to the vocabulary of a mid-16th century Spanish writer? Covarrubias defines lepra as "un género de sarna que cubre el cuerpo" and sarna as "una especie de lepra". He also writes that there are many types of lepra that covers the skin with ugly scabs or scale.

It is significant that Lastres, in 1951 and then again in 1954, stated that he was "inclined" to think smallpox was the cause of Huayna Capac's death.¹⁰ However, as we know, he was unable to consult Betanzos's chronicle for it was first published three decades later. Chronicles by Pablos or Ortiguera came later as well. In the 1950s, Lastres' research and writing on the subject peaked. He discussed the smallpox thesis in three different books. Rarely cited, his last, our favorite, was published in 1957. Here (La Salud Pública y la Prevención de la Viruela en el Perú. Lima: 1957) he prefers to "passover" the death of Huayna Capac, yet cannot resist commenting as follows (p. 19):

Revista de Indias 37(147-148 ene-jun 1977), 7-22.

⁹For the explanation of how a niece became a daughter, see Betanzos, Narrative, pp. 180-181.

¹⁰ Lastres, Historia de la Viruela, 25.

“Aunque hay algunos datos que hacen presumir que la epidemia que diezmó los ejércitos del Emperador indio Huayna Cápac fuera de viruela como lo hemos consignado en un trabajo anterior (1) sin embargo, dadas las interrogantes que se ciernen sobre este episodio epidemiológico, prefiere pasarlo por alto, y comenzar el estudio [de viruelas] desde la época de la llegada de los españoles en 1532.

As table 2 shows, only Guerra, writing four decades later, examined more accounts than Lastres, but even so the most prolific writer on the subject did not consider three chronicles, two of which propose alternative explanations: Borregán (perlesía), Pablos (lepra incurable), or Ortiguera (viruelas).

Pedro Cieza de León is the favorite source for modern historians who embrace the smallpox hypothesis, but here too there is a new edition, from a manuscript in the Vatican Library, discovered and transcribed in 1985 by editor Francesca Cantú. The key phrase reads:

Pues, estando Guaynacapa en el Quito con grandes compañías de jentes que tenía y los demás señores de su tierra... cuentan que vino una gran pestilencia de viruelas tan contagiosa que murieron más de dozientas mill ánimas en todas las comarcas, porque fue general; y dándole a él el mal no fue parte todo lo dicho para librarlo de la muerte, porquel gran Dios no era dello servido.¹¹

No historian has made much of the fact that Cieza de León prefaces his statement as to cause of death with the phrase “cuentan que”. Indeed Cieza de León is not alone in hedging his remarks, as noted above. A comprehensive evaluation of the narratives on the cause of death of Huayna Capac should take into account such cautionary expressions.

Some decades later, in his 1582 history of the city of Cuenca and the province of Quito, Padre Hernando Pablos — condensing the popular versions in the very region where the final illness of Huayna Capac broke out — affirmed that there occurred a “pestilencia muy grande en que murieron innumerable gente de un sarampión, que se abrían todos de una lepra incurable, de la cual murió este señor Guaina Capac, al cual salaron y llevaron al Cuzco a enterrar...” (Pablos, 1995: 271). What stands out in the

¹¹ Pedro de Cieza de León, *Crónica del Perú: segunda parte*, ed. Francesca Cantú (Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú, 1985), 199-200.

excerpt is the use of the indefinite article to describe *lepra*. Note also that measles cannot be confused with “leprosy”, which clearly at this time included a variety of ailments other than the flesh-eating disease.

In the 1630 *Memorial de las historias del Nuevo Mundo Piru* by Fray Buenaventura Salinas y Córdova there is an account regarding the death of Huayna Capac that is unlike any of the earlier chronicles. This text mentions no epidemic that swept through the Inca empire, nor any illness that killed the sovereign or his family. Salinas y Córdova’s narrative focuses on two Spaniards (Molina and Ginés) left behind by Pizarro on his second voyage to Peru, who were captured by Inca soldiers and brought before Huayna Capac. The ruler, angered by prophecies of the imminent loss of his kingdom (a trope debunked for the Aztec world by Camilla Townsend¹²), had the two Spaniards hacked to pieces as a sacrifice to the Sun god and cooked, after which he and his court consumed their flesh (Salinas y Córdova, 1957: 58-59).

Deconstructing the auguries and portents as Christian myth represented in this and other chronicles is beyond the scope of this paper, yet the frequency with which native portents are cited by chroniclers is striking. As early as 1544, a text by Vaca de Castro already has the Inca Huayna Capac foreseeing harsh times:

“*Guaina Capac Inga* en esta pacificacion y gobierno de *Quito*, entraron en la tierra los primeros cristianos, primeros descubridores, con el marques don Francisco Pizarro, que fueron los trece de la *isla del Gallo*... *Guaina Capac Inga*, sabido de cómo habían entrado los cristianos en la tierra y le dieron noticia déellos, luego dijo que había de haber grande [sic] trabajo en la tierra y grandes novedades; y al tiempo que se estaba muriendo de la pestilencia de las viruelas que fué el año siguiente...”¹³

Vaca de Castro was also the first chronicler to state that smallpox was the cause of Huayna Capac’s death. Later, Pedro Pizarro recounted Huayna Capac’s vision of dwarfs, preceding the smallpox attack:

Pues estando en esta obra dio entre ellos una enfermedad de viruelas, nunca entre ellos vista, la cual mató muchos indios; y estando Guainacapa encerrado en sus ayunos que acostumbraban hacer, que era

¹² Camilla Townsend, “Burying the White Gods: New Perspectives on the Conquest of Mexico,” *American Historical Review* (Jun 2003):659-687.

¹³ Marcos Jiménez de la Espada, ed., *Una Antigualla peruana* (Madrid: Tipografía de Manuel Gines Hernández, 1892), 21.

estar solos en un aposento y no llegar a mujer, no comer sal ni ají en lo que les guisaban, ni beber chicha (estaban de esta manera nueve días; otras veces, tres), pues estando Guainacápac en este ayuno, dicen que le entraron tres indios nunca vistos, muy pequeños como enanos, adonde él estaba, y le dijeron: ‘Inga, venímoste a llamar’, y como él vido esta visión y esto que le dijeron, dio voces a los suyos, y entrando que entraron, desaparecieron estos tres ya dichos, que no les vió nadie salvo el Guaina Capa, y a los suyos dijo: “¿Qué es de esos enanos que me vinieron a llamar?” Respondiéronle: “No los hemos visto.” Entonces dijo el Guaina Capa: “Morir tengo”, y luego enfermó del mal de las viruelas. Pues estando así muy enfermo, despacharon mensajeros a Pachacama... ¿qué harían para la salud de Guainacapa?, y los hechiceros que hablaban con el demonio, lo preguntaron a su ídolo, y el demonio habló en el ídolo y les dijo que lo sacasen al sol y luego sanaría. Pues haciéndolo así fué a la contra, que en poniéndole al sol murió este Guainacapa... y había diez años que era muerto cuando entramos en esta tierra...”¹⁴

Royal officials such as Vaca de Castro and relatives of the initial band of conquistadores, such as Pedro Pizarro, had ample reason to blame smallpox for the death of Huayna Capac and the destruction of the native populations. Every Indian who died of smallpox was one less death to be blamed on the conquistadores or government officials. Even native chroniclers, such as Juan de Santa Cruz Pachacuti Salcamayhua, relied upon the trope of sorcerers and seers to explain the Inca’s defeat:

...en donde estando caminando el ynga da Rayos a los pies y de allí buelbe p^a quito teniendo por mal aguero y qdo yba hazia la mar con su campo se vido a media anoche vesiblemte çercado de millon de millon de hombres y no sab<ia>en [ni supieron] quien fueron a esto <dizen que> dixo que eran almas de los bibos q dios abia mostrado significando q <a> abian de morir en la pestelencia tantos los quales almas dizen que venian contra el ynga de que el ynga entiende q era su enemigo y assi

¹⁴ Pedro Pizarro, “Relación del descubrimiento y conquista de los reinos del Perú,” in *Biblioteca de autores españoles desde la formación del lenguaje hasta nuestros días: Crónicas del Perú V* (Madrid: Ediciones Atlas, 1965), 181.

toca armas de aRebato y de alli buelbe a quito con su campo y haze fiesta de capac raimi solemnizandole y assi a oras de comer llega vn mensajero de manta negro el qual bessa al ynga con gran Reuerençia y le da vn putti o cajuela tapado y con llabe y el ynga mda [al mismo yn^o] que abra el qual dize que perdone deziendo q el hazedor le mandaua el abrir a solo el ynga y visto por el ynga La razon le abre la cajilla y de alli sale como maripossas o papelillos bolando o esparçiendo hasta desapareçer el qual abia sido pestelencia de sarampion y assi dentro de dos dias muere el general mihic naca mayta con otros muchos capitanes todos Las caras llenos de caracha y visto por el ynga mda hazer vna cassa de piedra p^a esconderse y despues se esconde en ella tapandose con la misma piedra y alli muere y al cabo de ocho dias saca caçi medio podrido y los embalsama y trae al cuzco En andas como si fuera bibo y bien bestido y armado y en la mano con su ttopa yauri o suntor paucar y mete en el cuzco con gran fiesta... Por la gente al Cuerpo muerto de guayna capac hazia Reue^a y despues de aber metido en la sepultura de sus passados pregona el llanto general por su muerte q hasta entonçes no abia nueba de su muerte...»¹⁵

Chroniclers may also have blamed smallpox for the death of Huayna Capac and the destruction of the native peoples, as a readily believable and wholly excusable cause, one that would resonate with Christian readers. With apparent frustration, Lastres observed in 1954 (p. 26):

Hay que convenir en que es materialmente imposible hacer diagnósticos retrospectivos muy precisos, porque los cronistas son gente empírica y dan descripciones muy arbitrarias. Además, que todos ellos escriben de oídas y muchos repiten lo que dijeron los primeros narradores.

Would Lastres have been less “inclined” to embrace the smallpox hypothesis if he had examined more of the evidence? Did his “inclination” take into account the ominous “cuentan que” or “se dicen” preceding several ascriptions?

¹⁵ Juan de Santa Cruz Pachacuti Yamqui, *Relación de antigüedades de este reino del Perú*, ed. Carlos Aranibar (Lima: Fondo de Cultura Económica, S.A. de C.V., 1995), 104. Further, this source sees sarampion (measles) as the cause of an epidemic which began in Cuzco: “y de alli ba a quito el ynga p^a descansar y dar nueba hordenança y tassas y entonces llega la nueba de cuzco que como abia pestilencia de sarampion y de alli pte p^a las conquista de nuevo Rey^o de opa luna y assi llega hasta los pastos y de mas adelante y ...

A symptomatic picture of the disease that caused the death of the Inca Huayna Capac emerges. He became ill in the region of Tomebamba, suffered from chills and fever and became delirious. His skin broke out with itchy eruptions that became swollen and pustular. They eventually produced scabs. His illness progressed swiftly, and as it did, at some point, the Inca became unable to move. Lastres (1954: 21) points out that “éste tuvo un proceso febril precedido de escalofríos y que luego sobrevinieron síntomas de excitación psíquica, delirio, coma y muerte...” What we cannot do with any certainty is to ascribe a cause of death. Moreover, if we are not to be entrapped by a creationist myth, we must consider the possibility of a disease that may have gone extinct.

Discrepancies among the sources should caution historians from facile spinning of inconsistencies in the historical record or, indeed, of cherry-picking only those sources that agree with the smallpox hypothesis (see Table 2). While no modern historian asserts flatly that Huayna Capac died of smallpox—on the contrary, most state that their conclusion is only an “inclination” (Lastres 1954) or “best guess” (Crosby 1972:52)—those who emphasize the primacy of virgin soil epidemics proceed to write their story as though the issue was incontrovertible.¹⁶ Grand narratives, such as William McNeill’s *Plagues and Peoples* and Jared Diamond’s *Guns, Germs and Steel*, sweep over the ambiguities.¹⁷

A linguistic reassessment

Before 1558, when both Spanish and Quechua speakers experienced an outbreak of smallpox in common, translating from the Quechua to Spanish was particularly uncertain. The smallpox epidemic of 1558-9 was a significant linguistic event because from that time Spanish and Quechua speakers could discuss the disease based on mutual experience. In 1954, the distinguished Peruvian medical historian, Juan B. Lastres, observed that the first Quechua dictionary, published in 1560, the *Lexicon* of P. Domingo de Santo Tomas, had no word for smallpox—and therefore, Lastres concluded, smallpox had not existed in ancient Peru. Lastres observed that finally in

¹⁶ Examples: Cook 1998, 72: “the Inca ruler Huayna Capac fell victim to a hideous alien disease.”; and 81-82: “The death of Huayna Capac provides a vivid illustration of what invariably occurred elsewhere in America when Old World epidemic was introduced. The virus that caused the death of Huayna Capac was not an isolated one; it was part of a great pandemic that swept vast regions of the Americas.”

¹⁷ William H. McNeill, *Plagues and Peoples*, New York, 1976; Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies*, New York, 1997. See also Michael B.A. Oldstone, *Viruses, Plagues, & History*, Oxford, 1998, 4; and Jonathan B. Tucker, *Scourge: The Once and Future Treat of Smallpox*, New York, 2001, 11.

1608 Fray Diego Gonzalez Holguín’s dictionary distinguished smallpox (huchuy muru uncoy) from measles (hutun muru uncoy). Lastres explained that in both dictionaries “mur” carried the meaning of round spot (such as “mur cauallo” for spotted horse). Lastres concluded his linguistic analysis, as follows:

En realidad la voz ‘mur’, en los diccionarios quechuas, se traduce como ‘mancha redondeada’; y el proceso llamado en quechua “mur oncco” sería, pues, ‘enfermedad de mancha’, una erupción cutánea caracterizada por manchas redondas que radican en la piel puede representar variados procesos, como viruela, sarampión, tifus exantemático, la misma verruga, o aún procesos eczematosos.¹⁸

What Lastres did not note was that by 1586 with the publication of Vocabulario y phrasis (attributed to Antonio Ricardo) the phrase “mur uncoy” had already come into use, to refer to smallpox.¹⁹

Table 3 near here (disease terms in early Quechua dictionaries)

Lastres’s linguistic findings and the fact that he did not consider the Vocabulario y phrasis stimulate a broader survey of terms in all three of the earliest Quechua dictionaries (Table 2): 1560 (Santo Tomas), 1586 (“Ricardo”²⁰), and 1608 (Gonzalez Holguín). Ours is the first analysis of all three dictionaries with respect to smallpox. To provide comparative context we discuss as well terms for other diseases, illnesses, and even destruction.

Domingo de Santo Tomas has the distinction not only of composing the first Quechua-Spanish dictionary, following two decades of pioneering linguistic fieldwork, but also of capturing the Quechua language before significant linguistic mixing had occurred. According to Raul Porras Barrenechea, the editor of the modern edition of the Lexicon, “En él hay todavía muy pocos aportes de origen español u occidental. No ha habido tiempo para el trasplante cultural sino de muy pocas palabras” (1951:xviii). “Cavallo” (caballo) is identified as one of those words, as is “quillay” (hierro, from the

¹⁸ Juan B. Lastres, Historia de la viruela en el Perú, in Salud y Bienestar Social 3, no. 9 (1954): 19, 20. See Fray Diego Gonzalez Holguín, Vocabulario de la lengua general de todo el Peru llamada lengua quechua o del Inca, ed. Raúl Porras Barrenechea (Lima: Universidad Nacional Mayor de San Marcos, 1952), 252, and Domingo de Santo Tomás, Lexicón, o Vocabulario de la lengua general del Perú (Lima: Instituto de History, 1951).

¹⁹ Cited in Noble David Cook, Born to Die: Disease and New World Conquest, 1492-1650 (Cambridge, 1998), 77.

²⁰ Guillermo Escobar Risco, author of the prologue of the fifth edition of the Vocabulario of 1586, argues that Antonio Ricardo was the publisher of this the first Quechua dictionary to be printed in Peru. Its

ancient word meaning literally “metal”). It is significant that Santo Domingo concentrated his research principally along the coastal lowlands from Tumbes to Lima instead of the highlands of Cuzco. The locus of his research is important because smallpox is supposed to have entered Peru from the coastal lowlands. Given the enormous linguistic diversity in Ancient Peru, Santo Domingo’s Lexicon is a treasure.

A systematic search of the Spanish yields Quechua words or phrases in all three dictionaries for *berruga*, *calenturas*, *cundir*, *curar*, *dolencia*, *enfermedad mortal*, *hambre*, *lepra*, *muerto de hambre*, *peca de la cara*, *romadizo* and *sarna*. It is striking, as noted by Lastres, that in the earliest dictionary, which was based on almost two decades of study but completed before the smallpox epidemic of 1558, no term existed for smallpox or measles. These first appear in the Vocabulario of 1586 and continue in Gonzalez Holguín’s work (1608), along with *contagión*, *infección*, *pestilencia*, *remedio*, and “pegar” (as in fish-paste), describing the means of transmitting smallpox and other contagious diseases.²¹ In this last dictionary of the three, only two new terms appear in this regard: *enfermedad de la mancha* and *mal de viruelas o sarampion*. Both carry identical translations: murú oncoy.

If smallpox caused such devastation in Peru before 1550, including the death of the Inca Huayna Capac, why is there not a single term associated with it in the earliest Spanish-Quechua dictionary? By 1560, native peoples had coined a phrase for “spotted horse” (murú cauallo) and Santo Domingo recorded this in the first Quechua Lexicon. Yet the term for smallpox with the identical linguistic root, murú oncoy, would only emerge in the dictionary of 1586, after the first documented smallpox epidemic, that of 1558-59. New as well to the second dictionary are five other terms associated with smallpox. Lastres studied the dictionaries to resolve the question of whether smallpox existed in Ancient Peru prior to 1492, as argued by a contemporary. Might we not extend the argument—that smallpox did not exist in Peru before 1558?

To round out this linguistic excursion, we must also consider terms that do not appear in any of the dictionaries. From a list of other illnesses, prepared before examining the dictionaries, the following terms do not occur: *dolores de costado*, *eczema*, *exantemático*, *erupción*, *paludismo*, *peste*, *picado*, *plaga*, *tabardete*, *tifus*, and

author, according to Escobar Risco, was the celebrated Jesuit linguist and missionary Padre Alonso de Barzana (p. xiii-xiv), who arrived in Peru in 1569.

²¹ McCaa, “Spanish and Nahuatl views,” n24.

tos. We have left for linguists the task of searching out terms referring to disease in Quechua that might have more metaphorical translations into the Spanish.

A thorough analysis would compare the appearance of various types of terms with those for disease (and would require the assistance of an expert Quechua linguist). Perhaps it is a matter that later dictionaries were simply more complete. For purposes of comparing the linguistic record on disease with that on destruction, Table 4 analyzes 16 terms on destruction and decay in the three earliest Quechua-Spanish dictionaries. The list is composed of words drawn from sixteenth-century narrative Spanish sources cited by the historian Carlos Sempat Assadourian who argues that destruction, not disease, was the principal cause of the demographic disaster.²² The earliest dictionary does not translate seven of these terms into the Quecha (*alboroto**, *despoblar pueblo**, *destronar en guerra*, *empalar*, *matanza*, *melancolía*, or *osario**). Of these the three starred words are recorded in the second dictionary. All appear in the third. On the other hand, none of these terms are as singularly destructive as smallpox is supposed to have been. While arguments could be advanced to explain the absence from the first dictionary of any of the half dozen terms commonly associated with smallpox, we conclude that the absence of evidence is more likely due to the absence of the phenomenon itself.

Table 4 near here (Destruction terms in early quechua dictionaries)

Evidence of the absence of smallpox from the lack of descriptions of pockmarks

Knowledge of smallpox has increased greatly in recent decades, yet few historians seem acquainted with new findings in the epidemiology of the disease.²³ The most significant for the present case is, first, the use of pockmarks, in modern times, to certify the extinction of natural smallpox, and, for historical times, to date the occurrence of epidemics. Second, but equally important, is new evidence regarding the rather low communicability of the disease.

While historians focus their attention on the death of Huayna Capac, silences in the record of smallpox among the Andean population have gone ignored. In contrast, in the case of Mexico, grossly disfigured survivors of the smallpox epidemic which struck in 1520 are reported in the earliest accounts. The eye-witness Motolinía writing in the 1530s noted “hoy día en algunos que de aquella enfermedad escaparon, parece bien la

²² “La gran vejación y destrucción de la tierra: las guerras de sucesión y de conquista en el derrumbe de la población indígena del Perú,” in *Transiciones hacia el sistema colonial andino* (Lima and Mexico City, 1994).

fortaleza de la enfermedad, que todo el rostro les quedo lleno de hoyos”²⁴ López de Gomara did not complete his History of the Conquests of Cortes until 1552, nevertheless he too remarked on pockmarked faces: "...los que quedaban vivos quedaron de tal suerte feos por haberse rascado, que espantaban á los otros con los muchos y grandes hoyos que se les hicieron en las caras, manos y cuerpo.”²⁵ His narrative, based on letters and interviews with Cortes, was written without the benefit of actually observing events in Mexico, yet he emphasized the persisting legacy of smallpox on the living. While these texts are less well known than, say, the drawings of smallpox victims in the Florentine Codex (completed a long generation later, in 1570-90), they nevertheless have a ring of authenticity. They were cited in the seventeenth century by Herrera in his General History (Decada II, libro 10, cap. IV, p. 398) and in the eighteenth by Clavijero (Libro IX, capit. 32, p. 377).²⁶

In contrast, in Peru, the historical record is silent about pockmarked native peoples, until 1565. As far as we have been able to determine, the observation by the Oidor Juan de Matienzo regarding the “pecas de viruelas en la cara” of the Inca Titu Cusi Yupanqui, dated June 18, 1565, is the first such reference in the documentary record for sixteenth century Peru.²⁷ Since the Inca was around forty years old at that time, he may have experienced the disease as an infant (as early as 1525?), but the fact that there is no report of a single native of this region bearing pockmarks prior to 1558 suggests that he was probably struck with the disease as an adult. Moreover, pockmarks become less distinct with age. The World Health Organization, in its campaign to eradicate smallpox, estimated in the case of Nigeria that among children pockmarks would no longer be visible in roughly one-half of the survivors within one to five years of an epidemic,²⁸ whereas among those surviving Asian variola major, the rate of

²³ The most important is the monumental two volume work F. Fenner, D.A. Henderson, I. Arita, Z. Ježek, and I.D. Ladnyi, eds., Smallpox and Its Eradication (Geneva: World Health Organization, 1988).

²⁴ Fray Toribio de Benavente o Motolinía, Memoriales o libro de las cosas de la Nueva España y de los naturales de ella. Edmundo O’Gorman, ed. (México: UNAM, 1971), 294.

²⁵ Francisco Lopez de Gomara, Historia de las Conquistas de Hernando Cortés. Carlos Maria de Bustamante, ed., México, 1826, I:279.

²⁶ Antonio Herrera y Tordesillas, Historia General de los Hechos de los Castellanos, Madrid: 1936 [1601-1615], p. 398: Este mal de la viruelas se extendió por toda Nueva España, y causó increíble mortandad; y era cosa notable [399] ver a los indios, que se salvaron, desfigurados en las manos, y rostros, con los hoyos de las viruelas, por causa de rascate." Francisco Javier Clavijero, Historia Antigua de México. México, 1987, p. 377: "Percieron muchos millares de hombres y quedaron algunos lugares despoblados. Aquellos cuya complexión prevaleció a la violencia del mal se levantaron tan estragados y con tan profundos vestigios del veneno en los rostros, que causaban espanto a los demás."

²⁷ See note 1.

²⁸ Fenner et al, Smallpox and Its Eradication, I:174.

permanent facial scarring was almost 70%. The disappearance of facial scars varied by the type, severity and age at which the subject experienced the attack, as well as the time elapsed since the event. Nevertheless, data on facial scarring was crucial to the certification of the eradication of smallpox for regions in Asia and Africa where public health infrastructure was rudimentary. Large-scale facial pockmark surveys were undertaken before certification was final. The official, two-volume report explained the process as follows:

It was reasoned that, if these surveys included all children up to 15 years of age, there would be some who had had smallpox when it was still endemic and would have pockmarks which the teams should detect. This served as an internal control in the survey, in that failure to detect any individuals with pockmarks would call into question the work of the team concerned. When children with pockmarks were detected, efforts were made to find out in which year they had contracted the disease that had caused the scarring. Such information was surprisingly easily obtained from most villagers. The age of the youngest pockmarked child also provided objective evidence as to when smallpox had last occurred.

...

Failure to find pockmarks in any children born since the occurrence of the last known case in the country provided important evidence that transmission of variola major had been interrupted.²⁹

The World Health Organization concluded (I:508) that “it was possible through facial pockmark surveys to determine the recent past history of smallpox.” Historians, too, have used evidence of scarring to date epidemics. Elizabeth Fenn cites numerous instances of references to pockmarked native peoples in the Pacific Northwest and Alaska.³⁰ One of the most telling is that by the English Captain Nathaniel Portlock dated August 12, 1787 referring to a settlement on the southeast coast of Alaska: “I did not observe any of the children under ten or twelve years of age that were marked; therefore I have great reason to suppose that the disorder raged a little more than that number of years ago.”³¹

²⁹Fenner et al, Smallpox and Its Eradication, II:1113, 1118.

³⁰ Elizabeth A. Fenn, Pox Americana: The Great Smallpox Epidemic of 1775-1782, New York, 2001, pp. 227-31.

³¹ Fenn, Pox Americana, p. 227.

If the World Health Organization accepted the absence of pockmarks after a certain date as evidence for the eradication of smallpox then, should not historians consider absence before a certain year as evidence for the absence of the disease? Why do no chroniclers of early Peru mention pockmarked faces of natives? Why have historians not discovered a single mention of a native with a pockmarked face before 1560? We favor discounting the presence of smallpox in Peru until there is a single verified instance of a smallpox scarred individuals prior to 1558.

The relatively low communicability of smallpox

It is easy to understand why smallpox appeared rather late in Peru, if one understands the difficulty of transmitting the disease. Although many historians, including those with training in medicine, consider smallpox to be extremely contagious in fact it is not. One reason that smallpox was so readily eradicated was precisely because of its “fairly low communicability”.³² For Huayna Capac to have died of smallpox, the disease would have had to travel from its incontrovertible presence in Mexico City in late 1520 through Northern South America either over the isthmus of Panama into the Colombian Chocó or through the Orinoco and Western Amazon basin.³³ While some historians write that this was “logical” or even “easy”,³⁴ we suspect that few are familiar with the terrain, and that none have attempted to paddle a dug-out up the Río Atrato or the any of the Amazon tributaries. Given the low population densities that must have prevailed in these areas five centuries ago, there were ample opportunities for the chain of spread to have been broken among innumerable small settlements.

The sole means of spreading smallpox was by direct contact with infected humans. While scabs contained large amounts of viral matter and could be transported over long distances, this material was highly fragile and was easily destroyed in the tropics by exposure to sunlight, high temperatures or humidity.³⁵ During the incubation period (1-7 days), an infected individual rarely displayed symptoms and the likelihood

³² Derrick Baxby, “Communication: Vaccines for Smallpox,” *Lancet* 354 (July 31), 422.

³³ There is a suggestion that the smallpox may have entered by way of Tierra del Fuego (Cook 1992), citing a conversation with Borah.

³⁴ Lastres, *Historia de Viruela*, 26; Donald R. Hopkins, *Princes and Peasants: Smallpox in History*. Chicago: University of Chicago Press, 1983, 209.

³⁵ Abbas M. Behbehani, *The Smallpox Story In Words and Pictures*. Kansas City: The University of Kansas City Medical Center, 1988, p. 182 notes that “the virus does not survive for more than a month” in the tropics. In the last decades of the campaign, WHO epidemiologists rigorously pursued the origins of outbreaks in tropical areas and found that all were “initiated solely by known human cases or well documented laboratory sources” (183).

of transmission was nil. Onset of the disease was heralded by a sudden rise in body temperature to 38.5-40.5°C, usually in 10-14 days. At that point the individual became highly contagious for about 10 days. During the first days of fever and rash higher frequencies of infection were observed following face-to-face contact. Longer-range airborne infection “appears to have been very rare”, usually assisted by mechanical ventilation, heating, or air conditioning systems. With the disease firmly established, in a day or two a rash formed as virus particles infected epidermal cells and skin lesions formed in a centrifugal pattern on the extremities of the body (face, hands, and feet). In fatal cases of normal variola major, death came between the tenth and sixteenth day. With haemorrhagic smallpox, an exceedingly rare type about which comparatively much has been written, death typically was precipitated from day six through twelve. Corpses were heavily contaminated and posed a serious occupational hazard for mortuary attendants. A second bout of somewhat reduced fever struck survivors at the beginning of the third week, and scabs began to separate about the same time.³⁶

Smallpox was much less contagious than influenza or malaria. Close personal contact was required. According to the WHO report, family members and close associates were at greatest risk of contacting the disease (I:191):

the overwhelming majority of secondary infections occurred in close family contacts of overt cases of smallpox, especially in those who slept in the same room or the same bed. Next in frequency were those who lived in the same house; residents of other houses; residents of other houses, even in the same compound (who would often have visited the house of the patient), were much less likely to become infected.

Historians typically exaggerate the speed of transmission as well. In the case of Mexico, we know that, in 1520, some five months were required for the disease to spread less than four hundred miles, inland from near Veracruz to Tenochtitlan (Mexico City). This rate of spread was slow, notwithstanding the presence of dense, agrarian populations and an intense travel along the route, some by Spaniards on horseback. While the spread averaged 2-3 kilometers per day, it is exceedingly unlikely that transmission could have been occurred at all through the straits of Darién or the jungles of the Chocó, where densities must have been considerably lower and the means of transportation more rudimentary.

³⁶ Fenner et al., Smallpox and Its Eradication, pp. 5, 37, 188-94. See pages 192-4 for the discussion of

Mesoamerican sunflowers, tobacco, or the domestic turkey never reached Northern South America in ancient times. Nor did the Andean guinea pig (cuy), potato or llama ever extend to Mesoamerica, even thousands of years after their domestication. Likewise Mesoamerican systems of writing flourished for thousands of years without taking root in the Andes (Diamond, 188-190). Amerindian languages, both north and south of the Darien Straits are highly diverse and localized, reflecting their isolation and lack of exchange. Diamond calls these societies “islands”, even though they were separated by geology and climate, not water (Diamond, 370). Corn developed in Mesoamerica 7-8,000 years ago, some 3-4,000 years earlier than in the Andes. It seems exceedingly unlikely that smallpox could have spread over this difficult terrain where the principal means of communication was dugout canoe or the human foot.

Huayna Capac’s Mummy

As Huayna Capac’s body was without corruption at the time immediately following his death, certainly the telltale marks of smallpox would have been evident to the observer, had they been present. Guaman Poma’s artfully depicts the mummy as it is born on a litter from Quito to Cuzco (Figure 1). There are no marks of any kind on the mummy’s face (or that of his most beloved wife or young son, also felled by the mysterious disease). Yet Guaman Poma frequently drew features on faces to complement his text with powerful visuals. On page 310, we find a drawing of a young couple, nude, with tears flowing from their eyes, as a rope suspends them by their hair from a tree (“The Inka’s punishments in Anta Caca of youthful fornicators, thaskikuna waqllispa huchallikuqkuna”). An illustration entitled “Wrathful, arrogant Dominicans force native women to weave for them” (p. 659) portrays an unshaven priest with several days of stubble forcing a native weaver to remain at her loom while tears stream from her face. Abuse was not limited to native peoples. On page 939 we see African slaves, agonized and tearful, being whipped by Spaniards.

Three other writers refer to the mummy of Huayna Capac. The Dominican friar Reginaldo de Lizárraga is silent regarding the outward appearance of the mummified royal remains (see his discussion of the idolatry practiced toward the Inca royal mummies as mentioned in his early seventeenth century work, the *Descripción y población de las Indias*, cf. Lizárraga, 1987: 175). If smallpox caused the death of Huayna Capac, the pockmarks would show on his mummified tissues, as was the case

with Ramses V's mummy in Egypt. The only living medical historian to have examined this mummy states that there is not the slightest doubt that the cause of death was smallpox. Hopkins speculates that the embalmers may have died suddenly, probably of smallpox, because completion of the embalming and burial appear to have occurred later.³⁷ For Huayna Capac on the other hand, the sources are silent about any such complications. In fact it seems that the embalming proceeded in the customary fashion, with the son Atahualpa keeping a bit of flesh for his own spiritual needs. Even though there is a substantially greater corpus of texts regarding the death of the Peruvian Inca than that of the Egyptian Pharaoh, without the mummy the exact cause of death is difficult to determine.³⁸

In his *Royal Commentaries of the Incas*, Garcilaso de la Vega describes seeing the mummy of Huayna Capac, early in 1560, along with two other male mummies – certainly those of Pachacutec (not Viracocha)³⁹ and Tupac Inca Yupanqui – and two female mummies in the house of Polo de Ondegardo. He also reports that as they were carried through the streets of Cuzco the Indians knelt, bowed with tears in their eyes and groaned. Recalling the moving personal encounter he had with the mummies before permanently leaving his home-country, Garcilaso writes:

[...] fui a la posada del licenciado Polo Ondegardo, natural de Salamanca, que era corregidor de aquella ciudad, a besarle las manos y despedirme de él para mi viaje. El cual, entre otros favores que me hizo, me dijo: “Pues que vais a España, entrad en ese aposento; veréis algunos de los vuestros que he sacado a luz, para que llevéis que contar por allá”. En el aposento hallé cinco cuerpos de los reyes Incas, tres de varón y dos de mujer. El uno de ellos decían los indios que era este Inca Viracocha,

³⁷ Hopkins, *Princes and Peasants*, 15: “if he [Ramses V] died of smallpox, his embalmers would likely have suffered a fearsome epidemic about two weeks after starting to prepare his body, and the source of such a focal outbreak would surely have been suspected. In any other society the deceased would already have been buried or cremated by the time such an outbreak occurred, but not in the case of a pharaoh in ancient Egypt. Fear of the infection (if not an acute shortage of embalmers) could then have postponed the remaining preparation and burial.” Note that not all pock-like marks in mummies prove to be smallpox. Arthur C. Aufderheide's new book, *The Scientific Study of Mummies* (Cambridge University Press 2003, p. 498), reports that a histological analysis of cells from a mummy of the Twentieth Dynasty long-suspected to be smallpox, proved, instead, to be a “bacterial lesion”. Aufderheide notes that “the facial lesions of Ramses V have not been verified histologically”. [We thank Jerry C. Rose for bringing this new finding to our attention.]

³⁸ Only a microscopic examination of his blood would show if the eleventh Sapa Inca died of *verruca peruana*, i.e. the Oroya Fever stage of bartonellosis, as had been alternatively proposed by Dr. Pablo Patrón (“La enfermedad mortal de Huayna Capac,” *La Crónica Médica*, XI (131 jul 15 de 1894), 183).

mostraba bien su larga edad; tenía la cabeza blanca como la nieve. El segundo decían que era el gran Tupac Inca Yupanqui, que fué bisnieto de Viracocha Inca. El tercero era Huayna Capac, hijo de Tupac Inca Yupanqui y tatarnieto del Inca Viracocha. Los dos últimos no mostraban haber vivido tanto; que aunque tenían canas, eran menos que las del Viracocha. [...] Los cuerpos estaban tan enteros que no les faltaba cabello, ceja ni pestaña. Estaban con sus vestiduras como andaban en vida. Los “llautos” en las cabezas, sin más ornamento ni insignia de las reales. Estaban asentados, como suelen sentarse los indios y las indias; las manos tenían cruzadas sobre el pecho; la derecha sobre la izquierda, los ojos bajos, como que miraban al suelo (Garcilaso de la Vega, 1976, bk. 5, ch. 29).

Moreover, Garcilaso had the opportunity to touch the hands of Huayna Capac’s mummy, “whose fingers were like sticks”, but if he noticed the fingers as “picados de viruelas” he did not mention it.⁴⁰ The far-reaching consequences that this physical contact with this grand-uncle might have had on the young emigrant, motivating him to compose afterwards in Spain a utopian view of Tawantinsuyu, have been ably explored by psychoanalyst Max Hernández (1993: 92-93).

Huayna Capac’s mummy was by custom initially kept in his palace, the Kasana, on the main square of Cuzco and looked after by the Tomebamba panaqa, which he had founded. There it was seen by a number of conquistadores after the Spanish re-founding of the city, including Cristóbal de Mena and Pedro Sancho de la Hoz. The latter describes the mummy in 1534 as being richly wrapped in textiles with only the point of his nose missing and accompanied by other effigies of clay or plaster adorned with his hair and fingernails, presumably some of his “bultos”, and in the clothes he had worn.⁴¹ What is striking about this description is the absence of any mention of pockmarks, such as would have likely been present had the Inca died of smallpox.

Some time later the mummy was transferred to his estates in the Yucay valley so that the Spaniards would not find it. There it was kept with much gold, silver and other

³⁹ Garcilaso’s mistake may have been deliberate, due to the internal conflicts between members of the royal panaqas, as noted by María Rostworowski de Diez Canseco (1953: 68).

⁴⁰ The text literally says: “Acuérdome que llegué a tocar un dedo de la mano de Huayna Capac; parecía que era de una estatua de palo, según estaba duro y fuerte...” (Garcilaso de la Vega, 1976, vol. I: 274).

⁴¹ Sancho de la Hoz (1962: 104-105) referred to the mummy of Huayna Capac as being intact, “envuelta en suntuosas ropas y que le faltaba nada más que la punta de la nariz...”

riches and his “huauque”, a golden statue of the king. It is known that early colonizers were actively searching for and seizing many mummies both in the city of Cuzco and on country estates in the years immediately following the conquest. Australian archaeologist Ian Farrington (1995) has identified the precise location where the mummy of Huayna Capac was hidden for about a quarter century as Quispeguanca, a complex of Inca structures some 500 meters north of the town of Urubamba.

Huayna Capac’s mummy remained concealed by his panaqa until late 1559 when, according to Sarmiento de Gamboa (1943, ch. 62: 151), it was found by the *corregidor* Polo de Ondegardo in a house in Cuzco on the road to the fortress of Sacsahuaman. The mummy was under the protection of two servants, Gualpa Tito and Suma Yupanqui. Wrapped in fine woolen mantles and cotton shrouds, it was still well preserved. However, Huayna Capac’s large golden “huauque” was never found.⁴²

Documentary evidence indicates that the rural palace of Quispeguanca was a very important location in the valley of Yucay. Disputes over access to the yanacunas of this area after the mummy had been discovered indicate that their function as well as that of the building was to protect the mummy. According to Farrington (1995: 57-59), the ruins at this site comprise at least 29 structures, indicating that the palace area was a location for both textile and ceramic manufacture.

THE SAN ANDRÉS HOSPITAL, LAST RESTING PLACE OF THE INCAS

Akin to the customs of many traditional peoples, the men and women of the Inca civilization worshiped the mummies of their ancestors, particularly of their rulers, in whose honor ceremonies and sacrifices were organized. Towards 1560, and in order to eradicate this so-called “idolatry”, the Viceroy Marquis of Cañete ordered the mummified remains of three or four Incas and two Coyas – their official wives – to be moved to the Hospital Real de San Andrés in Lima (see the generic descriptions in Guillén Guillén, 1983; Hinojosa Cuba, 1999; Deza and Barrera, 2001). These remains had been found in various places near Cuzco by the *corregidor* Polo de Ondegardo, presumably supported by the “entente” newly achieved between the viceroy and the head of the Tomebamba panaqa, Sayri Tupac, one of the various grandchildren of Inca Huayna Capac.

⁴² See in this regard the version transmitted by Rafael Loredo (1955), although with no source citation, about the profit that Governor Cristóbal Vaca de Castro gained by keeping the mummy of Huayna Capac and allowing it to be displayed to his descendants for worship only in exchange for money.

The San Andrés Hospital, the oldest in the viceroyalty of Peru and one of the few remaining from the sixteenth century in the western hemisphere, was founded in 1550 in order to provide health care to low-income, male inhabitants of Spanish descent. The hospital's original facilities included a church and catacombs where hundreds of deceased patients were buried until early in the nineteenth century. As an approximation to the number of skeletons still buried in the complex, it is mentioned that in an 1876 reconstruction "it was seen, between two thick walls, around 1,000 to 1,500 human remains" (Polo, 1877: 378).

Being an important part of the monumental circuit of downtown Lima, the San Andrés Hospital has remained almost unchanged with regard to the original plan in which it was built (and eventually rebuilt) during colonial times. The edifice served as a hospital until 1875, when the sanitary authorities of Peru opened the newly erected Hospital Dos de Mayo in Lima. The former royal hospital served then for an entire century as the home of two Catholic female congregations: the Sisters of the Charité of Saint Vincent de Paul first and then afterwards for the Hijas de María Inmaculada (cf. Alzamora Castro, 1963: 19-24, and Rabí Chara, 1999: Cronología).

The building was eventually declared a historic landmark by the Instituto Nacional de Cultura, on 28 December 1972 (Resolución Suprema no. 2900-72-ED). After an earthquake caused severe structural damages to the building in October 1974, the religious community of the Hijas de María Inmaculada abandoned this location and the building was partially restored to accommodate a public school for girls, the Colegio Nacional de Mujeres "Oscar Miró Quesada de la Guerra".⁴³

According to a series of chronicles written in the sixteenth and seventeenth centuries, the worshipped remains of some former Inca sovereigns were placed in a patio at the Hospital Real de San Andrés, the main hospital for the "república de españoles" in Lima. This action was done in full secrecy in order to prevent a massive reaction from the indigenous people residing in and visiting from time to time the viceregal capital (cf. Castelli González, 1981: 209-210). However, no source has ever affirmed that the mummies were destroyed, burned or removed, even though a series of repressive ecclesiastical campaigns, the so-called "extirpación de idolatrías", occurred during the seventeenth century.

⁴³Eventually, a perplexing resolution issued by the Instituto Nacional de Cultura on 27 April 2000 authorized the partial demolition of the edifice, with the object of building a new school infrastructure.

In the twentieth century a formal attempt, promoted by the Sociedad de Beneficencia Pública de Lima and conducted by the historian José de la Riva-Agüero, was made to rescue the Inca royal mummies kept there, in the Barrios Altos neighbourhood of Lima. Riva-Agüero and his collaborators suspended their investigation in August 1937, under the conviction that their efforts would not be useful without the aid of Spanish original manuscripts, i.e. depictions of the San Andrés Hospital, that were kept in the Archivo General de Indias in Seville (see Riva-Agüero, 1966: 398-400, and Hampe Martínez, 2000b).

GEOPHYSICAL SURVEY AT THE SAN ANDRÉS HOSPITAL

In August 2001, acting with the official permission of the Instituto Nacional de Cultura (Resolución Directoral Nacional N° 783-2001/INC), a group of archaeologists performed a geophysical survey in the 5,500 square-meter area of the former Hospital Real de San Andrés. This group of researchers was led by Professor Brian S. Bauer of the Department of Anthropology, University of Chicago (a well-known scholar and investigator of the Inca civilization in Cuzco), and included Dr. Patrick Ryan Williams of the Field Museum, Chicago, and Lic. Antonio Coello Rodríguez of the Universidad Nacional Mayor de San Marcos, Lima. All data were collected using a GSSI SIR-2000 digital ground penetrating radar with a 400 MHz antenna and set at 120 ns range.

Ground penetrating radar (GPR), sometimes called ground probing radar, georadar, subsurface radar or earth sounding radar, is a noninvasive electromagnetic geophysical technique for subsurface exploration, characterization and monitoring. It is widely used in locating lost utilities, environmental site characterization and monitoring, agriculture, archaeological and forensic investigation, groundwater, pavement and infrastructure characterization, mining, ice sounding, and a host of other applications. It may be deployed from the surface by hand or vehicle, in boreholes, between boreholes, from aircraft and from satellites. It has the highest resolution of any geophysical method for imaging the subsurface, with centimeter scale resolution sometimes possible.⁴⁴

Thanks to a public campaign directed by Dr. Teodoro Hampe Martínez, this resolution was withdrawn (see Hampe Martínez, 2000a).

⁴⁴ The first ground penetrating radar survey was performed in Austria in 1929 to sound the depth of a glacier. The technology was largely forgotten (despite more than 36 patents filed between 1936 and 1971 that might loosely be called subsurface radar) until the late 1950's when U.S. Air Force radars were seeing through ice as planes tried to land in Greenland, but misread the altitude and crashed into the ice. In 1972 Rex Morey and Art Drake began Geophysical Survey Systems Inc. to sell commercial ground penetrating radar systems.

GPR uses electromagnetic wave propagation and scattering to image, locate and quantify changes in electrical and magnetic properties in the ground. Depths of investigation (and resolution) are controlled by electrical properties through conduction losses, dielectric relaxation in water, electrochemical reactions at the mineralogical clay-water interface, scattering losses, and (rarely) magnetic relaxation losses in iron bearing minerals. Depth of investigation varies from less than a meter to over 5,400 meters, depending upon material properties. Detectability of a subsurface feature depends upon contrast in electrical and magnetic properties, and the geometric relationship with the antenna. Quantitative interpretation through modeling can derive from ground penetrating radar data with such information as depth, orientation, size and shape of buried objects, density and water content of soils, and much more.

As a result of the survey, distributed in 52 grids, a map of the site has been composed (see Appendix A) in which initially identified anomalies are marked as dots. “Anomaly of note” refers to an anomaly at least a couple of meters across and at more than a meter in estimated depth (assuming that a travel time of 20 nanoseconds corresponds to about one meter in physical depth). Screen captures of the filtered and processed data have been provided, on eight illustrations, for the anomalies of particular interest. The Appendix includes a table with numerical ratings for each grid on a scale of 1-5, with a grade 1 anomaly having the most potential for further investigation.⁴⁵

ANTHROPOLOGICAL AND PALEOPATHOLOGICAL PROSPECTIVES

Previous bio-anthropological studies done on colonial contexts in Peru have focused on individual remains, such as the cases of the conqueror Francisco Pizarro (d. 1541) and Saint Rose of Lima (d. 1617). To date, a paleo-epidemiological approach to representative sample populations from this period is still lacking. In this context, the upcoming archaeological explorations at the San Andrés Hospital provide a unique opportunity for addressing a number of important medical and anthropological questions as well as to fill a gap in Peruvian medical history.

While many studies have focused on the Andean anthropological record, a remarkably scant number of them have done the same on early colonial collections. The main reason for this is basically the lack of scientifically excavated cemeteries or catacombs dating from the times of Spanish domination (see Lombardi Almonacín,

⁴⁵ Many of the anomalies noted on the map appear to be small, regularly repeating signatures that were probably produced by the antenna jumping over a small obstacle or hole, or a gap between flooring materials (e.g., wood over concrete).

1992: 2-4). On the other hand, chronicles and other documentary sources support an increased morbidity and mortality among Native Americans after 1492.

Despite the uncertainty of retrieving the Inca royal mummies, previous successful experiences studying pre-Columbian mummies permit the researchers at the Universidad Peruana Cayetano Heredia in Lima to be ready to identify and study remains of similar nature as they are found.⁴⁶ In sum, as a complement to prospective research lines concerning the history of medicine, education, and public assistance, the former Hospital Real de San Andrés represents a unique monument and emblem for the Andean civilization. The possibility exists, in fact, that the remains of Pachacutec, Tupac Inca Yupanqui, Huayna Capac and other sovereigns of the Tawantinsuyu still could be found at this location. Rescuing the Inca royal mummies would represent an event of enormous importance for Peru and the Andean countries--in short, the recovery of the heart of the Inca tradition.

Conclusion.

Although the current historiographical orthodoxy attributes the death of the Inca Huayna Capac to smallpox, a more skeptical examination of the evidence suggests that this hypothesis is unlikely. First, disagreement among the chroniclers is more profound than many historians are wont to recognize. Second, two of the most important early sources to report smallpox do not fully embrace the idea, and instead simply recount a story (“cuentan que”). Third, historians assume that smallpox was a highly contagious disease, but this too is not the case. It is exceedingly unlikely that smallpox could have traversed Northern South America in the early sixteenth century without the assistance of humans propelled by sailing vessels or horses. Fourth, the linguistic evidence from early Quechua dictionaries shows that of the half dozen most common terms used to describe the contagion of smallpox, none appear in the first dictionary written before the well-documented outbreak of 1558. Most appear for the first time in a second dictionary, published three decades later. Chroniclers writing before 1558 who attribute Huayna Capac’s death to smallpox, do not state what Quechua words or phrases were used to bridge the linguistic gap between native informants and Spanish writers. Fifth, the detailed descriptions of the mummy of Huayna Capac do not mention pockmarks

⁴⁶ Quite recently, a generous initiative of the Rector Universidad Peruana Cayetano Heredia, Dr. Oswaldo Zegarra, has assigned a definite location – the Carrillo-Maúrtua House – for the Pedro Weiss Paleopathology Laboratory. By chance, this location happens to be only about 300 meters from the San Andrés Hospital. As a consequence, this new laboratory shall work both for the study of San Andrés collections and their curation.

(and these sources have gone unreported by historians of his death). While it is possible that he died before the eruptions could occur no historian has located a single description of any pockmarked native person of the Andean region before 1558. This might not appear remarkable except that there is a report of one case afterward, from 1565, of the Inca Titu Cusi Yupanqui. The World Health Organization conducted wide-scale surveys of pockmarked individuals to certify the eradication of the disease. Might historians accept the absence of references to facial scarring in Peru before 1558 as evidence for the absence of the disease?

Additional evidence, either the description of pockmarked native peoples or mummies, including perhaps that of the Inca Huayna Capac, signalling the presence of smallpox (or not), will be necessary to resolve this conundrum. In the meantime, to continue to blame smallpox for the death of Huayna Capac (and the destruction of the native peoples of the Andean Region) without considering alternative explanations in at least as great detail, seems to these authors an unfortunate distortion of the historical record.

Then too there is an alternative explanation for the destruction of Tawantinsuyu. One of the most comprehensive and thoroughly researched is that by Carlos Sempat Assadourian (1994). His thickly documented analysis based on an impressively wide range of sources blames the demographic disaster on three decades of near total war, excessive labor demands, wholesale environmental destruction, widespread famine, and sheer cruelty. Alien diseases are secondary factors, dating from 1558 with the first smallpox epidemic, once the population has already been halved.

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Year	Author	Death of Inca Huayna Capac		
		Year	Description (with page number)	Origin
1533	Francisco de Xerez	1524	115: Atahualpa, attributes death to "aquella enfermedad"	
c.1539	The anonymous soldier (Cristóbal de Mena)		138: "y Guaynacapa se fué en jornada a Popayán, y de vuelta que volvió murió en Quito."	
1543	Pedro Sancho de la Hoz		Describes mummy; cause of death not mentioned.	
1544	*Cristóbal Vaca de Castro		22: "se estaba muriendo de la pestilencia de las viruelas"	
1550	*Pedro de Cieza de León	1527-28	200: "cuentan que vino una gran pestilencia de viruelas tan contagiosa que murieron más de dozientas mill ánimas"	
1557	Juan de Betanzos	1526-28	201: An illness that took away his reason and understanding and gave him "sarna y lepra".	
c.1565	Alonso Borregan		84: "una enfermedad que le dio muy recia que debía de ser perlesia"	
1572	*Pedro Pizarro	1521	181: "enfermó del mal de las viruelas ... y murió este Guainacapa."	
1572	Pedro Sarmiento de Gamboa	1524	165: An illness of fevers, although others say of smallpox and measles; Ninan Cuyoche [his son] died of the pestilence of smallpox.	Cuzco
1582	Fr. Hernando Pablos		270: "una pestilencia muy grande en que murieron innumerable gente de un sarampión que se abrían todos de una lepra incurable, de la cual murió este señor Guainacapac"	
1586	Fr. Miguel Cabello de Balboa	1525	459: "y paró en unas mortales calenturas y sintiendose cercano de la muerte hizo su testamento"	Cuzco
1586	*Toribio de Ortiguera		355: "y murió el dicho Guaynacapa de enfermedad de viruelas antes que los españoles le pudiesen ver"	
1590	Martín de Murúa		135: "unos dicen que murió [en Quito] de calenturas, y otros dicen que habiendo gran pestilencia de viruelas en un pueblo llamado Pisco"	Cuzco
1605	Padre Reginaldo de Lizarraga		516: "epidemia de romadizo y dolor de costado que consumio la mayor parte de los indios"	
1613	El Inca Gracilazo de la Vega		264: "dióle una enfermedad de calenturas, aunque otros dicen que de viruelas y sarampión."	
1613	Juan de Santa Cruz Pachacuti Yanqui		252: "abía sido pestilencia de sarampión, el Ynga, después se esconde en ella tapándose con la misma piedra y allí muere."	Cuzco
1615	*Felipe Guaman Poma de Ayala		108: "Enbía dios su castigo: Pistelencia de saranpión y birguelas muy grandísimas, entienpo de Guayna Capac Ynga, se murió muy mucha gente y el Ynga."	
1630	Fray Buenaventura de Salinas y Córdova		59: "Fue tanta la melancolía de Huayna Capac en Quito, considerando, que le auian dicho los agoreros y el Sacerdote, que les mandó que allí lo pusiesen a morir"	
1630	Fr. Giovanni Anello Oliva	1523	83: "le dio una grave dolencia que los Indios llaman Uanti, y en nuestro romance bubas que le quittó la vida"	
1653	*Fr. Bernabé Cobo		160: "dijo el Inca que se moriría, y luego le dió el mal de las viruelas. Estando muy enfermo se murió."	

* = author attributes death of Inca Huayna Capac solely to smallpox.

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Table 2. Inferring Cause of Death of the Inca Huayna Capac:
Primary Source Cited (ordered by year of composition)
by Secondary Source (with year of publication)

Author	First Published	Cause	*Polo 1913	*Lastres 1954	*Dobyns 1963	Hemming 1970	*Wachtel 1971	*Crosby 1972	Assadourian [1987] 1994	*Cook 1998	Guerra 1999	*Alchon 2003
Xerez	1534	Aquella enfermedad	.	.	.	.	.	.	.	.	.	.
Anon.	1917	Murió	X	.	.	.	.	.	.	.	.	.
Sancho	1543	(describes mummy)	.	.	.	.	.	.	.	.	.	.
*Vaca de Castro	1934	Viruelas	X	Yes	.	.	.	.	Yes	.	.	.
*Cieza de León	1554	Viruelas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Betanzos	1987	Sarna y lepra	X	X	X	X	X	X	X	Yes	Yes	.
Borregan	1948	Perlesía	X	Yes	.	.	.	.	.	.	.	.
*Pizarro	1842	Viruelas	Yes	Yes	.	.	.	Yes	Yes	Yes	Yes	.
Sarmiento de Gamboa	1906	Fevers	Yes	Yes	Yes	Yes	.	Yes	Yes	Yes	Yes	Yes
Pablos	1965	Una lepra incurable	X	X	X	Yes	.	.	.	.	.	.
Cabello de Balboa	1951	Unas mortales calenturas	X	Yes	Yes	Yes	.	Yes	Yes	Yes	Yes	Yes
*Ortiguera	1968	Viruelas	X	X	X	.	.	.	.	.	.	.
Murúa	1925	Calenturas o viruelas	X	.	.	Yes	.	Yes	Yes	.	Yes	.
Lizarraga y Ovando	1905	Romadizo y dolor de costado	Yes	.	Yes	Yes	.	Yes	.	.	Yes	.
Vega	1613	Calenturas	Yes	Yes	.	Yes	Yes	Yes	Yes	.	Yes	Yes
Pachacuti Yamqui	1873	Sarampión	.	Yes	Yes	Yes	Yes	.	Yes	.	Yes	Yes
*Poma de Ayala	1936	Saranpión y birguelas	X	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Salinas y Córdova	1630	Melancolía	.	.	.	.	.	.	.	.	.	.
Anello Oliva	1895	Bubas	.	Yes	.	.	.	.	.	.	Yes.	.
*Cobo	1892	Viruelas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	.	Yes	Yes
Total sources cited			6	11	7	10	5	9	10	6	12	7
Sources cited that mention smallpox			3	5	3	3	3	4	5	3	4	3

* = death of Inca Huayna Capac attributed to smallpox

"X" = Secondary account published before first publication of primary source and thus evidence could not have been taken into consideration.

Note: Works must cite primary source directly to be tallied "Yes".

Sources: Primary: See Table 1. Secondary:

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Spanish	<u>Santo Tomas</u> (1560)	<u>“Ricardo”</u> (1586)	<u>Gonzalez Holguín</u> (1608)
Berruga (o peca de la cara)	Moro, ticti o rimpicota; hacer - Moroyani	Ticti	Ticti; hacerse verruga - tictiyan
Bubas	.	Huanti, huantictam onconi	Tener – Huantictam vnconi huanti vncoytam vnconci huanti hapihuan, o vncuhuan
Calenturas	Rupay huncuy; con frío chucchu	Rupay oncoy; con frío chucchu; lenta chaquirupay oncoy	Rupay vncuy; tener - Rupaytam vnconi o rupay vncoytam vnconi;
Contagion		Pahuac oncoy	Contagiosa dolencia – Ppahuac vncoy ranticuk vnccuy
Cundir mancha	Cundir, crecer poco a poco como mancha - Mizmini, gui	Miranvisuin	Mapa mirarin o mirarccun mizmirccun mizmirin
Curar	Cura de enfermo – hambinin	Hampini	Hampini
Dañar	Dañoso – guaclic	huaclicchini	huaclicchini o huchallicuni
Dolencia	Huncuy	Oncoy nanay	Vnccuy nanacuy nanay
Enfermar de calentura y frío	.	chuchuni	Chuchuni chuchuhuanmichucchum hapihuan chuchuymanchayani
Enfermar de la calentura	.	Rupaytam onconi, rupay oncoytam onconi	Rupaytam vnconci rupay oncoytam vnconci rupaymi vnccohuan o hapihuan rupayman michayani
Enfermedad de mancha		.	Muru oncoy
Enfermedad mortal	Huncuy, o quixiay	Huañuy oncoy	Huañuy hatun vnccoy o sullumantu hatun nanay
Flujo de sangre	.	Vsputay yahuarapay	Cenca yahuar hamupayay sutuy vnccoy o vsputay
Hambre	Yarecay	Yarecay, yarcay.	Yareccay
Infección	.	Inficionar = rantini	Inficionar a otro pegando sus pecados o enfermedad = Huchantam vnccoynintam rantiyacun pahuachin
Lepra	Caracha	Caracha llecte	Lluttasca llecte o

			lluttascca ccaracha
Mal	Manaalli	Mana alli	Mana allin
Mal de viruelas o sarampion			Muru vncoy
Maltrato	.	-ar – quezachani	Huchapac mirachicuymichay
Mancha redondeada	Muru	Cundir la mancha – visuin	Manchar mas o cundir la mancha = Mapam mmizmirin mirarccun
Mortandad	.	Huañuypacha	
Muerte	Guñuy	Huañuy	Huañuy
Muerto de hambre	Micuímanta Guañusca	Micuymantan huañuni o huañusca	Yarecaymanta o micuymanta huañuni muchucuni huanacuni yarecaypa apariscamcani huañuy huañuytam yarecani yarecayapatihuan
Peca de la cara	Moro	Mirca	Mirca
Pegar (enfermedad)	.	.	Vnccoymtam rantiy cupuni
Perlesía	.	Chiriyoncoy	Chirirayay vncco y o çuçunca çuçunca vncco y
Pestilencia	.	Pahuac oncoy	P. mal pegajoso = ppahuak vncoy o rantiy rantiy, o ranticuk vncco y
Prevención		Prevenirse – camaricuni, camarayani	
Remedio	.	-ar allichant, yanapani	Yachacupucuk; -ar allichapuni o yacha cuchipuni
Romadizo	Chulli	Chulli	Chulli
Sarampion	.	Muru oncoy	Hatun muru vncuy
Sarna	Çulpo; sarna tener – çulpuyani . gui.o	Caracha	Caracha; llecte caracha
Viruelas	.	Muru oncoy	Huchuy muru vncuy

<u>Spanish</u>	<u>Santo Tomas (1560)</u>	<u>Ricardo (1586)</u>	<u>Gonzalez Holguín (1608)</u>
Alboroto	.	Tacuricuy	Tacuricuy
Castigar	Mochochini, gui	Muchuchij	Muchuchini mirani
Codiciar	Monapayani, gui	Munani; codiciador munac, munapayac	Munarini munapayani ñocapcanman ñini munapucuni
Combate	Aucanacuy	-ir atinacuni	-ir Atipanacuni auca nacuni
Crueldades	Ancha piñac; cruel cosa sin misericordia manacoyapayac	Cruel = haucha	Cruel = haucha
Desbaratar	D. Batalla – chicrichini, gui o atini gui	Atini llasani; huaclichini	D. en guerra - Huaclichachini
Despoblado pueblo	.	Purumasca llacta	Purumllacta o purumyasca llacta, culluk o kulluchiscallacta
Despoblar, - ado	Purumachini, gui, o purum	Purum (yermo)	Llactactanpurum yachini kulluchini cculluchircuni
Destrozar en guerra	.	.	Champirayani huancurayani
Empalar	.	.	Kazpiman çattini o Kazpieta çattiycupuni
Esclavo	Pinas	E. habido de guerra = Piñas - comprado = rantisca runa	E. habido de guerra = Piñas; E. comprado Rantiscaruna; E. hazer o captiuar – Piñaschani
Fatiga	Fatigar – llaquini, gui	Llaquicuy puticuy	Machitayay; Fatigar el cuerpo con trabajos – Huañuyta llamkachini o ñaccarichini
Matanza	.	.	Matar a muchos = huañu chircarini
Melancolía	.	.	M. enfermedad Pputirayay huaccanayay vnccoy
Osario	.	Tullu taucasca colosca	Tullu tauccasca ccotosca

Figure 1. “379. The body of Huayna Capac Inka, being carried from Quito to Cuzco for burial”



Note the absence of pockmarks on the face of Huayna Capac's mummy. The beautifully crafted, realistic illustrations in this pictorial history of Early Peru frequently depict tears and welts on the faces of individuals (for our favorites, see pp. 219, 310, 453, 659, 879, 882, 888, 939, and 955), but Huayna Capac's face is wholly clear of marks of any kind.

Source: Felipe Guaman Poma de Ayala, El primer Nueva corónica y buen gobierno, <http://www.kb.dk/elib/mss/poma/index-en.htm>, p. 379.

Appendix A. Results from Ground penetrating radar (GPR)
of the former Hospital Real de San Andres

Grid 12: Mark problems prevent effective 3D modeling and slicing in Radan, but examination of the profiles reveals that the anomaly identified on the map is in fact quite large (approximately 3 x 4m in area) but also relatively faint. The top of the anomaly appears to be a subsurface stratum at approximately 50 ns in depth. A faint “X” signature – an indicator of reverberation – on several of the profiles indicates that the pulses were bouncing between two geological or architectural contacts. However, given the relative thinness of the anomaly itself (approximately 10 ns) and the faintness of the “X” reverberation signature, it is not thinkable this is a subsurface cavity on the order of what our project is looking for. See illustration no. 1.

Grid 14: There is a large anomaly in the center of the grid extending from about 20 to 35 ns in depth. However, the photo indicates that this area was retiled at some point. On the surface, two clear lines of different tile correspond to sewer covers noted during data collection. These likely sewer pipes are shown below in a 2-ns-thick plan view at 10.5 ns depth and north at the top. Also note the center area of torn-up tile. Then at 25 ns depth, the larger center anomaly is visible. Even if it is more than just noise from the disturbed patio tile, the center anomaly may not be associated with the more shallow diagonal sewer pipes. However, in sum, it appears that this patio has seen extensive work in relatively recent times (i.e., the twentieth century). See illustrations no. 2 and no. 3.

Grid 46: There is a large (3 x 3 m), roughly triangular zone of high reflection at the north side of the grid. There are two possible confounding factors, however; first, surface and near-surface slices also show reflections in the same area, so the deeper one could be an echo of this. Also, in profile the anomaly is solid-looking in plan but in profile is made up mostly of “X” signatures that could be oscillations between strata or walls. See illustration no. 4 (48 ns depth, 1 ns thick, north at the bottom).

Grid 49: Extremely noisy profiles. The most promising anomaly noted is probably the curved rock or brick surface (vault?) that was visible during collection. It seems to reach approximately 2.5-3 m beneath the surface, although of course the travel time assumptions for such an estimate are extremely shaky. See illustration no. 5.

Grid 52: There is a large downward-curving surface with its apex at approximately 75 ns or 3 m depth. In some profiles, wide “X” signatures are visible

beneath the curve, centered around 100 ns. This depth is near the limit of this unit's capabilities; the strength of the X reflection despite the weakness of the signal may indicate an open space (crypt?) beneath the curved surface. In the profile shown at illustration no. 6, the apparent column or shaft of high reflection is an artifact of ringing near the surface. However, even this ringing is perhaps a good sign, as it occurs precisely beneath the engraved marble slab noted during data collection. Small but very well-defined "X"s beneath the slab (not visible on the illustration) indicate that it probably covers an open shaft.

The main body of the "crypt" measures approximately 15 x 8 x 1.5 m. Its apparent truncation at the east end of the chapel could be due to the change in floor material from mosaic to large tiles. The apparent greater depth of the "crypt" feature on the western end is due in part to the column of oscillating reflections from the marble slab's underside. However, even given this caveat, it is clear that there is a very large feature beneath the chapel floor, beginning at a depth (75 ns) considerably below 50 ns, the level at which a plane of high reflection (possibly bedrock) occurs in many other grids. See illustrations no. 7 and no. 8.

QUALITATIVE TABLE FROM THE GPR SURVEY

Grid	Rating	Grid	Rating	Grid	Rating
1	1	21	5	41	5
2	5	22	4	42	5
3	4	23	5	43	5
4	4	24	4	44	4
5	5	25	5	45	5
6	5	26	5	46	2
7	5	27	5	47	5
8	5	28	5	48	4
9	5	29	5	49	2
10	5	30	5	50	5
11	5	31	5	51	3
12	3	32	5	52	1
13	4	33	5		
14	3	34	4		

15	5	35	5		
16	5	36	4		
17	5	37	5		
18	5	38	5		
19	5	39	5		
20	4	40	5		

Appendix B. The Death of the Inca Huayna Capac according to Juan de Betanzos, *Suma y narración de los Incas*, ed. María del Carmen Martín Rubio (Madrid: Ediciones Atlas, 1987), 200-201.

estúvose en la ciudad del Quito holgándose y recreándose bien así como se holgaban en la ciudad del Cuzco seis años en fin de los cuales que en el Quito estuvo le dio una enfermedad la cual enfermedad le quitó el juicio y entendimiento y dióle una sarna y lepra que le puso muy debilitado y viéndole los señores tan al cabo entraron a él pareciéndoles que estaba un poco en su juicio y pidiéronle que nombrase señor pues estaba tal al cabo de sus días a los cuales dijo que nombraba por señor a su hijo Ninancuyochi el cual había un mes que había nacido y estaba en los Cañares y viendo los señores que aquel tan niño nombraba vieron vieron [sic] que no estaba en su juicio natural y dejárosle y saliéronse y enviaron luego por el niño Ninancuyochi que había nombrado por señor y otro día tornaron a entrar a él y preguntárosle de nuevo que a quién dejaba y nombraba por señor y respondiósle que nombraba por señor a Atagualpa su hijo no acordándose que el día antes había nombrado al niño ya nombrado y luego los señores fueron al aposento do Atagualpa estaba al cual dijeron que era señor y reverenciárosle como a tal el cual dijo que él no lo quería ser aunque su padre le hubiese nombrado y otro día tornaron los señores a Guayna Capac y viendo que Atagualpa no quería serlo y sin le decir cosa del otro día pasado y pidiéronle que nombrase señor y díjoles que lo fuese Guascar su hijo... después de haber nombrado al Guascar en la manera ya dicha por señor dende a cuatro días expiró y luego que acabó de expirar volvieron los mensajeros que habían ido por el niño que había nombrado por señor Guayna Capac el cual habían hallado muerto que aquel día que llegaron había muerto de la misma enfermedad de Lepra como su Padre y dende a poco que llegaron estos mensajeros llegaron otros mensajeros que enviaban los caciques de Tumbes a Guayna Capac por los cuales mensajeros le hacían saber como habían llegado al puerto de Tumbes unas gentes blancas... Guayna Capac el cual como falleciese los señores que con él estaban le hicieron abrir y toda su carne sacar aderezándole porque no se dañase sin le quebrar hueso ninguno le aderezaron y curaron al sol y al aire y después de seco y curado vistiéronle de ropas preciadas y pusieronle en unas andas ricas y bien aderezadas de pluma y oro y estando ya el cuerpo así enviárosle al Cuzco con el cual cuerpo fueron todos los demás señores que allí estaban ...

Lastres, 1957:

De todas maneras es necesario decir que en el quechua o **runa simi**, existe la voz **murú**; y la combinada **murú onccooy** o enfermedad de mancha, que puede identificar la viruela, como otros procesos exantemáticos. Los cronistas Pedro Pizarro, Miguel Cabello Balboa, Antonio de Herrera, Garcilaso Inca, Borregán, Santa Cruz Pachacuti Yamqui, Sarmiento de Gamboa, Cieza de León, Huamán Poma de Ayala, Anello Oliva, y los médicos Paredes, Olano, Tello y Arcos, se han ocupado extensamente de este delicado problema de paleo-patología, abogando por diversos diagnósticos. Los más opinan por la viruela, algunos por el tifus exantemático, y otros por el paludismo o la sífilis. El diagnóstico de viruela no es improbable dado que Huayna Capac tuvo noticias de la primera expedición conducida por Pizarro y que llegara al río San Juan. Nordenskjöld asevera que indios guaraníes penetraron por el Oriente en el Imperio Incaico en 1526, en lo que es la actual Sucre (Chuquisaca). Los ejércitos incaicos rechazaron esta invasión. Todo esto puede hacer pensar, aunque no [20] con un fundamento valedero, que la viruela fue conocida por los Incas en cuyo caso la epidemiología habría que hacerla retroceder a los años comprendidos entre 1525 y 1529.